

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

THE DEVELOPMENT OF CONTEXTUALIZED MODULE IN GENERAL MATHEMATICS
FOR AGRICULTURE STUDENTS

A Thesis Presented to the
Faculty of the Graduate School
College of Education
West Visayas State University
La Paz, Iloilo City

In Partial Fulfilment
of the Requirements for the Degree
Master of Arts in Education
(Mathematics)

by

Reeann B. Dailo

January 2021

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

APPROVAL SHEET

A Thesis for the Degree
Master of Arts in Education
(Mathematics)

by

Reeann B. Dailo

Approved by the Research Committee:

JONATHAN C. GLORIAL, Ph. D., Chairperson

RICKY M. MAGNO, Ph.D., Member

NANET T. TADIA, Ph.D., Outside Expert

ROSEMARIE G. FELIMON, Ph. D., Adviser

PETER ERNIE D. PARIS, Ph. D.
Dean

January 2021

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

Dailo, Reann B. "*The Development of Contextualized Modules in General Mathematics for Agriculture Students.*" Unpublished Graduate Thesis. Master of Arts in Education (Mathematics). West Visayas State University, College of Education, La Paz, Iloilo City, January 2021.

Abstract

This developmental research aimed to develop a contextualized module in general mathematics for agriculture students. The progress was based on the Analyze, Design, Develop, Implement, and Evaluate (ADDIE) Model. The "analyze," "design," and "develop" stages were accomplished using the data gathered from the interviews with two general mathematics teachers and two agriculture teachers from two different public schools in Leon, Iloilo. Agriculture is incorporated through the integration of agriculture on topic contents (functions, piecewise function, rational functions, equations, and inequalities, exponential functions, equations, and inequalities, and logarithmic functions, equations, and inequalities), contextualized problem-based learning activities and examples, authentic assessment of learning and inclusion of agriculture directly experienced by students as motivation. For the implementation stage, the learning module was pilot tested in Grade 11 agriculture students composed of 33 students. The evaluation stage involved the experts' rating of the material's activity and students' satisfaction. Mean, and standard deviation were used in the analysis. The result showed that the developed module was highly acceptable, and the students were also highly satisfied. The module was appropriate material with

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

agriculture integration in the classroom. Experimental studies may be done to ascertain the developed module's effectiveness.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

TABLE OF CONTENTS

	Page
Title Page	i
Approval Sheet	ii
Acknowledgment	iii
Abstract	viii
Table of Contents	xi
List of Tables	xiii
List of Figures	xiv
List of Appendices	xv
 Chapter	
1 INTRODUCTION TO THE STUDY	1
Background of the Study	2
Theoretical and Conceptual Framework of the Study	5
Paradigm of the Study	6
Statement of the Problem	7
Definition of Terms	7
Delimitation of the Study	9
Significance of the Study	10
2 REVIEW OF RELATED LITERATURE	12
Contextualization and Its Benefits	12

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

	The Links among Mathematics, Contextualization and Agriculture	19
	Module Development	24
	Summary	32
3	RESEARCH DESIGN AND METHODOLOGY	34
	Research Design	34
	Methodology	35
	Phase I - Preliminary Investigation	35
	Phase II - Data Collection Procedure	40
	Phase III - Data Analysis Procedure	44
4	RESULTS AND DISCUSSIONS	49
	Agriculture lessons that could be integrated in General Mathematics	50
	The Agriculture Integrated Module	60
	Acceptability of the Module	68
	Students' Satisfaction of the Module	75
5	SUMMARY, CONCLUSIONS, IMPLICATIONS AND RECOMMENDATIONS	82
	Summary of the Problem, Method, and Findings	82
	Conclusions	84
	Implications	85
	Recommendations	86
	References	89
	Appendices	101

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

LIST OF TABLES

Table		Page
1	<i>Agriculture lessons in general mathematics</i>	59
2	Acceptability rating of Contextualized Module in General Mathematics for Agriculture Students in terms of Physical Aspects	69
3	Acceptability rating of Contextualized Module in General Mathematics for Agriculture Students in terms of Objectives	70
4	Acceptability rating of Contextualized Module in General Mathematics for Agriculture Students in terms of Learning Activities	72
5	Acceptability rating of Contextualized Module in General Mathematics for Agriculture Students in terms of Evaluation Procedure	73
6	Acceptability rating of Contextualized Module in General Mathematics for Agriculture Students in terms of Contextualization	74
7	Overall Acceptability Rating of the Contextualized Module in General Mathematics for Agriculture Students	75
8	Students' Satisfaction of the Contextualized Module in General Mathematics for Agriculture Students in Terms of Physical Aspects	76
9	Students' Satisfaction of the Contextualized Module in General Mathematics for Agriculture Students in Terms of Learning Activities	78
10	Students' Satisfaction of the Contextualized Module in General Mathematics for Agriculture Students in Terms of Evaluation Procedure	79
11	Students' Satisfaction of the Contextualized Module in General Mathematics for Agriculture Students in Terms of Relevance to Agriculture	80
12	Overall Students' Satisfaction Rating of the Contextualized Module in General Mathematics for Agriculture Students	81

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

LIST OF FIGURES

Figure		Page
1	The Paradigm of the Study	6
2	The Research Procedure	41
3	An example on basic calculations in functions	51
4	An example on division of irregular field into regular areas	53
5	Graphing rate of the growth of a corn plant	56
6	Exponential function problem which involves horticulture	57
7	Suggested learning activity	58
8	The outline of the topics for the contextualized module in General Mathematics for agriculture students and its parts	61
9	The envision part of the module	62
10	The engage part of the module	63
11	The explore part of the module	64
12	The experience part of the module	65
13	The evaluate part of the module	66
14	The agri-fact part of the module	67

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

LIST OF APPENDICES

Appendix		Page
A	<i>Letter for the Teachers</i>	102
B	Consent Form of Teachers	104
C	Letter for the Experts	106
D	Experts' Evaluation Form	108
E	Interview Schedule for Math Teachers	112
F	Interview Schedule for Agriculture Teachers	115
G	Guide for Document Analysis	118
H	Students' Satisfaction Survey Form	120
I	Letter for Validators	124
J	Letter for the Principal	126
K	Sample Accomplished Document Analysis Guide	128
L	Thematic Map of Agriculture Lessons in General Mathematics	132

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

90

References

- Abu Bakar, M. B., & Cheng, C. M. (2017). *The impact of using modules in the teaching and learning of english in Malaysian polytechnics: An analysis of the views and perceptions of English language teaching*. Jabatan Pengajian Am, Politeknik Melaka, Jabatan Politeknik, Kementerian, Pendidikan, Malaysia.
http://www.polimelaka.edu.my/portalpmk/images/images/JPA/research/cmc_mab.pdf
- ADB. 2011. *Country Partnership Strategy: the Philippines, 2011-2016*. Manila.
- Adedayo, R.O. (1999). *Agricultural economics for colleges and secondary schools*. Ado-Ekiti, Adedayo Printing Nigeria Limited. 65-171.
- Ajai, I. J. & Imoko, T. B. (2011). *Mathematics as a tool for sustainable national development and for addressing Nigerian challenges in the 21st century*. Nasher Journal 9(2) 95-101. <https://scholar.google.com/citations?>
- Akissani, I. & Muntari, I. (2015). *The role of mathematics in agricultural development*. In Sadiku, J.S (ed.) *Proceedings of September 2015 Annual National Conference of Mathematical Association of Nigeria (M.A.N.)*. 317-324.
<https://docplayer.net/154269690-Abacus-mathematics-education-series-vol-42-no-the-role-of-mathematics-in-crop-production-technologies-implications-for-extension-delivery.html>

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

91

Anderson, R. & Anderson, S. (2012). *Emerging Themes in Integrating Mathematics into Agricultural Education: A Qualitative Study of Star Teachers in Virginia.*

Journal of Career and Technical Education, Volume 27, Number 2, Winter, 2012.

https://scholar.google.com.ph/scholar?q=Anderson+2012,+Emerging+Themes+in+Integrating+Mathematics+into+Agricultural+Education&hl=en&as_sdt=0&as_vis=1&oi=scholart

Ayeni, A. A., Babatunde, A. & Fadare, A. O. (2015). *Enhancing the teaching and learning of commercial mathematics for entrepreneurship skills development.* A paper presented at the 5th Annual National Conference of School of Sciences, Federal College of Education (Special), Oyo, Oyo State.

<https://www.iiste.org/Journals/index.php/JNSR/article/viewFile/26516/27190>

Baker, E. D., Hope, L., & Karandjeff, K. (2009). *Contextualized teaching and learning: A faculty primer.* Sacramento, CA: The Research and Planning Group for California Community Colleges, Center for Student Success. Retrieved from <http://www.careerladdersproject.org/docs/CTL.pdf>

Becker, M., McElvany, N., & Kortenbruck, M. (2010). *Intrinsic and extrinsic reading motivation as predictors of reading literacy: A longitudinal study.* Journal of Educational Psychology, 102(4), 773–785. DOI: 10.1037/a002008.

https://www.researchgate.net/publication/48207370_Intrinsic_and_Extrinsic_Reading_Motivation_as_Predictors_of_Reading_Literacy_A_Longitudinal_Study

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

92

Berns, R. G. & Erickson, P. M. (2001). *Contextual teaching and learning: Preparing students for the new economy*. The Highlight Zone: Research.
<https://files.eric.ed.gov/fulltext/ED452376.pdf>

Black, H., Govinda, R., Kiragu, F. & Devine, M. (1993). *School Improvement in the Developing World: An Evaluation of the Aga Khan Foundation Programme*. SCRE Research Report, no. 45; DFID Evaluation Report EV545. Scotland: The Scottish Council for Research in Education. <https://books.google.com.ph/books?id>

Boroch, D., Fillpot, J., Hope, L., Johnstone, R., Mery, P., Serban, A., Gabriner, R. S. (2007). *Basic skills as a foundation for student success in California community colleges*. Sacramento, CA: The Research and Planning Group for California Community Colleges, Center for Student Success. Retrieved from http://www.cccbsi.org/Websites/basicskills/Images/Lit_Review_Student_Success.pdf

Bottge, B. A., & Cho, S.-J. (2013). Effects of enhanced anchored instruction on skills aligned to Common Core math standards. *Learning Disabilities: A Multidisciplinary Journal*, 19(2), 73–83. Retrieved from <http://ldaamerica.org/learning-disabilities-a-multidisciplinary-journal/>

Bottge, B. A., Ma, X., Gassaway, L., Toland, M., Butler, M., Cho, S. J. (2014). Effects of blended instructional models on math performance. *Exceptional Children*, 80, 423–437. doi:10.1177/0014402914527240

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

93

- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology, 3*(2), 77–101.
<https://doi.org/10.1191/1478088706qp063oa>
- Brenner, M. E., Mayer, R. E., Moseley, B., Brar, T., Duran, R., Reed, B. S., & Webb, D. (1997). Learning by understanding: The role of multiple representations in learning algebra. *American Educational Research Journal, 34*, 663-689.
<https://doi.org/10.1177/0091552111416227>
- Bringas, H. A. (2014). *Localization -contextualization*-slide share. Retrieved July 30, 2014, from www.slideshare.net/lenfermdz/localization-contextualization
- Center for Occupational Research and Development (2012). *What is contextualize teaching?* <http://www.cord.org/contextual-learning-definition/>
- Damerow, P. Ed. (1986). *Mathematics for all. Problems of cultural selectivity and unequal distribution of mathematical education and future perspectives on mathematics teaching for the majority*. Paris: Unesco Press.
<https://eric.ed.gov/?id=ED279519>
- Donnelly, R., & Fitzmaurice, M. (2005). *Designing Modules for Learning*. In G. O'Neill, S. Moore & B. McMullin(eds.)Emerging issues in the practice of University Learning and Teaching, Dublin, All Ireland Society for Higher Education (AISHE).
<https://arrow.tudublin.ie/ltcbk/4/>
- Enemali, I. A. & Adah, O. C. (2015b). Quality assurance in educational administration in the teaching of farm mathematics for national integration in Nigeria. *Journal of Education and Practice, 6*(23) 52-56. <https://eric.ed.gov/?id=EJ1079020>

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

94

- Enemali, I. A. & Adah, O. C. (2015a). Empowering individuals and communities through agricultural education: The role of mathematics education. *Journal of Vocational and Technical Educators*, 4 (4) 46-50.
<https://www.iiste.org/Journals/index.php/JNSR/article/viewFile/26516/27190>
- Felder, R. M., & Spurlin, J. (2005). *Applications, Reliability and Validity of the Index of Learning Styles*. *International Journal of Engineering Edition*, 21(1), 103-112.
Retrieved from [https://wss.apan.org/jko/mls/Learning%20Content/ILS_Validation \(LJEE\).pdf](https://wss.apan.org/jko/mls/Learning%20Content/ILS_Validation(LJEE).pdf)
- Flores, M. M. (2010). *Using the concrete-representational-abstract sequence to teach subtraction with regrouping to students at risk for failure*. *Remedial and Special Education*, 31(3), 195-207. doi: 10.1177/0741932508327467
- Forest, E. (201). The ADDIE Model: Instructional Design. *Educational Technology*:
<http://educationaltechnology.net/the-addie-model-instructional-design/>
- Gillespie, M. (n.d.). *EFF research principle: A contextualized approach to curriculum and instruction*. Knoxville, TN: Equipped for the Future. Retrieved from
<http://www.edpubs.gov/document/ED001934W.pdf>
- Gutierrez, Rochelle. (2002). Enabling the practice of mathematics teachers in context: Toward a new equity research agenda. *Mathematical Thinking and Learning*, 4, 145-187. doi: 10.1207/S15327833MTL04023_4.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

95

Hall., W. (n.d). Best practices for developing content modules and module pages.

Office of Distance Education.

<https://www.wcupa.edu/distanceed/documents/BestPracticesContentModules.pdf>

Heid, M. (1997). The technological revolution and the reform of school

mathematics. *American Journal of Education*, 106(1), 5-61.

<http://www.jstor.org/stable/1085673>

Hudson, C. C. & Whisler, V. R. (2007). Contextual teaching and learning for

practitioners. *Systemics, Cybernetics and Informatics*, 6(4), p. 54-55. Adult and

Career Education, Valdosta State University Valdosta, GA 31602, USA. ISSN:

1690-4524. [www.iiisci.org/journal/cv\\$/sci/pdfs/e668ps.pdf](http://www.iiisci.org/journal/cv$/sci/pdfs/e668ps.pdf)

Jordan, L., Miller, M., & Mercer, C. D. (1998). The effects of concrete to semi-concrete

to abstract instruction in the acquisition and retention of fraction concepts and skills. *Learning Disabilities: A Multidisciplinary Journal*, 9, 115-122.

<https://eric.ed.gov/?id=EJ594987>

Krause, S. J., Waters, C., & Stuart, W. J. (2016). Effect of contextualization of content

and concepts on students' course relevance and value in introductory materials classes. American Society for Engineering Education.

<https://asu.pure.elsevier.com/en/publications/effect-of-contextualization-of-content-and-concepts-on-students-c>

Lewis, L. N. (1984). *Applied mathematics in agricultural research*.

<http://calag.ucanr.edu/archive/?type=pdf&article=ca.v038n03p2>

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

96

- Mazzeo, C., Rab, S. Y., & Alssid, J. L. (2003). Building bridges to college and careers: Contextualized basic skills programs at community colleges. Brooklyn, NY: Workforce Strategy Center. http://go.collegeforamerica.org/l/37322/2016-01-20/3rt1r/37322/149233/BUILDING_BRIDGES_TO_COLLEGE_AND_CAREERS_CONTEXTUALIZED_BASIC_SKILLS_PROGRAMS_AT_COM.pdf
- Nardo, M., & Hufana, E. (2014). Development and evaluation of modules in technical writing. *American Journal of Educational Research*, 2, 341-350. doi: 10.12691/education-2-6-2.
- Nucum, K. N. (2018). TVL: 101 Your Essential Guide to the SHS TVL Track in the Philippines. <https://blog.edukasyon.ph/senior-high/tvl-101-your-essential-guide-to-the-shs-tvl-track-in-the-philippines/>
- Nworah, F. C. (2015). *Mathematics application for agricultural development in Nigeria*. In Sadiku, J.S (ed.) Proceedings of September 2015 Annual National Conference of Mathematical Association of Nigeria (M.A.N.).72-77. <https://www.iiste.org/Journals/index.php/JNSR/article/viewFile/26516/27190>
- Obiedo, R. V. & Jugar, R. R. (2017). Contextualized teaching on the problem solving performance of students. http://journal.umindanao.edu.ph/wp-content/uploads/2018/01/UM20172110_Contextualized-teaching-on-the-problem-solving-.pdf

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

97

- Parker, S., Traver, A., Cornick, J. (2017). Contextualizing developmental math content into introduction to sociology in community colleges. CUNY Queensborough Community College. DOI: 10.1177/0092055X17714853.
<https://journals.sagepub.com/doi/pdf/10.1177/0092055X17714853>
- Paris, D. (2011). *Culturally sustaining pedagogy: A needed change in stance, terminology, and practice*. *Educational Researcher*, 41(3), 93–97.
- Perin, D. (2011). *Facilitating student learning through contextualization*. CCRC Working Paper No. 29. Community College Research Center, Teachers College Columbia University.
<https://ccrc.tc.columbia.edu/media/k2/attachments/facilitating-learning-contextualization-working-paper.pdf>
- Puri, K., Cornick, J., & Guy, G. M. (2014). An analysis of the impact of course elimination via contextualization in developmental mathematics. *MathAMATYC Educator*, 5(2), 4-10. <https://files.eric.ed.gov/fulltext/EJ1106053.pdf>
- Rapley, T. (2007). *The Sage qualitative research kit. Doing conversation, discourse and document analysis*. Sage Publications Ltd.
<https://doi.org/10.4135/9781849208901>
- Reyes, J. D., Insorio, A. O., Ingreso, M. L., Hilario, F. F., & Gutierrez, C. R. (2019). *Conception and Application of Contextualization in Mathematics Education*. *International Journal of Educational Studies in Mathematics*, 2019, 6(1), 1-18.

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

98

- Richey, R., & Klein, J. (2005). Developmental research methods: Creating knowledge from instructional design and development practice. *Journal of Computing in Higher Education*, 16, 23-38. doi: 10.1007/BF02961473.
- Richey, R. C., Klein, J. D., & Nelson, W. A. (2004). Developmental research: Studies of instructional design and development. In D. H. Jonassen (Ed.), *Handbook of Research on Educational Communications and Technology*, 1099–1130. Lawrence Erlbaum Associates Publishers. <https://psycnet.apa.org/record/2004-00176-041>
- Shinn, G. C., Briers, G. E., Christiansen, J. E., Harlin, J. F., Lawver, D. E., Linder, J. R., et al. (2003). *Improving student achievement in mathematics: An important role for secondary agricultural education in the 21st century*. (Unpublished manuscript). College Station, TX: Texas A&M University.
<http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.130.5829&rep=rep1&type=pdf>
- Simpson, M., & Nist, S. (2000). An update on strategic learning: It's more than textbook reading strategies. *Journal of Adolescent & Adult Literacy*, 43(6), 528-541. <http://www.jstor.org/stable/40016831>
- Stefanou, S., Willis, C., Segerson, K., Burt, O., & Norton, K. (n.d). *The role of mathematics in agricultural economic education and research*.
<https://ideas.repec.org/a/ags/nejare/28990.html>

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

99

Spring (2010). *Realia and contextualization*.

<http://gaining.educ.msu.edu/resources/node/422>.

Stone, J. R., III, Alfeld, C., Pearson, D., Lewis, M. V., & Jensen, S. (2006). *Building academic skills in context: Testing the value of enhanced math learning in CTE (Final study)*. St. Paul, MN: National Research Center for Career and Technical Education. from <http://136.165.122.102/UserFiles/File/Math-in-CTE/MathLearningFinalStudy.pdf>

Stripling, C. T. & Roberts, G. (2013). *Investigating the Effects of a Math-Enhanced Agricultural Teaching Methods Course*. Journal of Agricultural Education. Volume 54, Number 1, pp. 124 – 138. DOI: 10.5032/jae.2013.01124124.

<http://www.jae-online.org/attachments/article/1725/54.1.11.Stripling.pdf>

Tabach, M. & Friedlander, A. (2008). The role of context in learning beginning algebra. In C. E. Greenes, R. Rubenstein (Eds.), *Algebra and algebraic thinking in school mathematics: Seventieth yearbook* (pp. 223–232). Reston, VA: The National Council of Teachers of Mathematics, Inc.

Taylor, P. & Mulhall, A. (1997). *Contextualising teaching and learning in rural primary schools: Using agricultural experience*. Volume 1 - Education Research. Paper No. 20, 1997, 64 p. Serial No. 20. ISBN: 1 86192 045 8. Department for International Development.

<https://ageconsearch.umn.edu/record/12884/files/er9720v1.pdf>

WEST VISAYAS STATE UNIVERSITY
COLLEGE OF EDUCATION
GRADUATE SCHOOL
Iloilo City

100

- Valenzuela, H. (2018). A multiple case study of college-contextualized mathematics curriculum. *MathAMATYC Educator*, 9(2), 49-55. Retrieved from <http://www.amatyc.org/?page=MathAMATYCEducator>
- Wisely, W. C. (2009). *Effectiveness of contextual approaches to developmental math in California community colleges* (Unpublished doctoral dissertation). University of the Pacific, Stockton, CA.
- Witzel, B., Mercer, C., & Miller, M. (2003). Teaching algebra to students with learning difficulties: An investigation of an explicit instruction model. *Learning Disabilities Research & Practice*, 18, 121 - 131. doi: 10.1111/1540-5826.00068.
- Zanna, F. A. (2014). Mathematics for agricultural development: A key for peaceful co-existence. Mathematics Department, Federal College of Education, Potiskum, Yobe State, p. 4 – 6.
<https://www.globalacademicgroup.com/journals/pristine/FALMATA%20ALHAJI.pdf>